

The opinion in support of the decision being entered today
is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ANIL KAVIPURAPU

Appeal 2007-1427
Application 09/826,240
Technology Center 2100

Decided: July 24, 2007

Before ALLEN R. MACDONALD, JEAN R. HOMERE, and
ST. JOHN COURTENAY III, *Administrative Patent Judges*.

COURTENAY, *Administrative Patent Judge*.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134(a) from the
Examiner's rejection of claims 21-40. We have jurisdiction under
35 U.S.C. § 6(b).

We AFFIRM.

THE INVENTION

The disclosed invention relates generally to electronic circuits. More particularly, the disclosed invention is directed to a power selection system for use with a reconfigurable circuit (Specification 1).

Independent claims 21, 28, and 34 are illustrative:

21. A power selection system for use with a reconfigurable circuit, comprising:

a monitoring circuit configured to determine a transition rate of at least one node located within said reconfigurable circuit; and

a mode selection circuit coupled to said monitoring circuit and configured to reconfigure said reconfigurable circuit by altering a power characteristic applied to at least a portion thereof based on a comparison between said transition rate and a predetermined operating range.

28. A method of operating a reconfigurable circuit, comprising:

determining a transition rate of at least one node located within said reconfigurable circuit; and

reconfiguring said reconfigurable circuit by altering a power characteristic applied to at least a portion thereof based on a comparison between said transition rate and a predetermined operating range.

34. A reconfigurable circuit, comprising:

a monitored sub-circuit, including:

a delay element, associated with a node of said reconfigurable circuit, having a switch;

a multiplier interposed between said node and an output of said reconfigurable circuit; and

a power selection system, including:

a monitoring circuit that determines a transition rate of said node; and

a mode selection circuit coupled to said monitoring circuit that reconfigures said monitored sub-circuit by altering a power characteristic applied thereto based on a comparison between said transition rate and a predetermined operating range.

THE REFERENCE

Mittal	US 5,719,800	Feb. 17, 1998
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THE REJECTIONS

Claims 21-25 and 28-32 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Mittal.

Claims 26, 27, and 33-40 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Mittal.

Rather than repeat the arguments of Appellant or the Examiner, we make reference to the Briefs and the Answer for the respective details thereof.

Independent claims 21 and 28

We consider first the Examiner's rejection of independent claims 21 and 28 as being anticipated by Mittal. Since Appellant's arguments with respect to this rejection have treated these claims as a single group which stand or fall together, we will select independent claim 28 as the

representative claim for this rejection because we find it is the broadest independent claim in this group. *See* 37 C.F.R. § 41.37(c)(1)(vii)(2004).

Appellant argues that “Mittal does not teach reconfiguring the reconfigurable circuit but instead teaches maintaining the configuration of the circuit and reducing power consumption of the circuit by throttling performance thereof.” (Br. 10). Appellant asserts that “Mittal discloses changing power consumption by altering a rate but does not disclose reconfiguring a reconfigurable circuit by, for example, altering a rate.” (Br. 11, ¶ 1). Therefore, Appellant concludes that Mittal “does not teach reconfiguring a reconfigurable circuit as recited in independent Claims 21 and 28.” (*id.*).

The Examiner disagrees. The Examiner asserts that Appellant has defined “reconfiguring a reconfigurable circuit” in the claims as “altering a power characteristic applied to at least a portion thereof ...” (Answer 6; *see also* claims 21 and 28). The Examiner reads the claimed “reconfigurable circuit” on Mittal’s microprocessor (Answer 6; *see also* Mittal, col. 2, ll. 14-19). The Examiner further reads the recited “at least one node located within said reconfigurable circuit” on Mittal’s functional unit that the Examiner corresponds to a node located within the processor (*see* Mittal, col. 2, ll. 14-19; *see also* claims 21 and 28). The Examiner interprets switching the functional unit between a normal mode of operation and a reduced-power mode in Mittal as altering a power characteristic of the functional unit (*see* Mittal, col. 5, ll. 25-30) (Answer 6).

In rejecting claims under 35 U.S.C. § 102, a single prior art reference that discloses, either expressly or inherently, each limitation of a claim

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invalidates that claim by anticipation. *Perricone v. Medicis Pharm.*, 432 F.3d 1368, 1375-76, 77 USPQ2d 1321, 1325-26 (Fed. Cir. 2005) (citation omitted).

We begin our analysis by broadly but reasonably construing the recited term “reconfiguring” in a manner fully consistent with Appellant’s definition set forth in the Specification:

A reconfigurable circuit, such as a reconfigurable digital filter or a reconfigurable digital Pseudo Random Binary Sequence (PRBS) generator, is a circuit (perhaps with analog components), that has certain relevant digital design characteristics that are designed to be revocably modifiable at the direction of a client.
(Specification 1, ¶ 0002).

Our reviewing court has determined that “the specification is ‘the single best guide to the meaning of a disputed term,’ and that the specification ‘acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1321, 75 USPQ2d 1321, 1332 (Fed. Cir. 2005) (en banc) (internal citation omitted).

In light of Appellant’s broad definition of a “reconfigurable circuit,” we agree with the Examiner’s reading of the claim on the reference. In particular, we find that Mittal discloses altering a power characteristic applied to a device or component in at least two ways: (1) by reducing the applied voltage, and (2), by reducing the clock rate (*see* Mittal, col. 5, ll. 1-3). Because Mittal discloses a microprocessor and/or functional unit that has *certain relevant digital design characteristics that are designed to be revocably modifiable at the direction of a client*, such as power

consumption, we find the weight of the evidence supports the Examiner's position that Mittal discloses "reconfiguring said reconfigurable circuit by altering a power characteristic applied to at least a portion thereof ...," as claimed (claim 28).

Furthermore, we note that Appellant acknowledges in the Specification that "power consumption in a digital circuit is directly related to the frequency of switching of its internal nodes." (Specification 17, ¶ 0031). We find Mittal explicitly discloses dividing a system clock by two to implement a reduced-power mode (col. 8, ll. 29-32, Fig. 2). Because the frequency of switching transitions in clock-driven digital circuits (e.g., a microprocessor) is a function of the clock frequency, we agree with the Examiner that Mittal also discloses the recited step of "determining a transition rate of at least one node located within said reconfigurable circuit," as claimed (claim 28). Specifically, we find the recited step of "determining a transition rate ..." broadly but reasonably reads on altering a clock rate to save power, as disclosed by Mittal (col. 5, ll. 1-3; col. 8, ll. 29-32, Fig. 2).

Because we find Mittal discloses all that is claimed, we conclude the Examiner has met the burden of presenting a prima facie case of anticipation. Accordingly, we will sustain the Examiner's rejection of representative claim 28 as being anticipated by Mittal.

Pursuant to 37 C.F.R. § 41.37(c)(1)(vii), we have decided the appeal with respect to the remaining claims in this group on the basis of the selected claim alone. Therefore, we will sustain the Examiner's rejection of

independent claim 21 as being anticipated by Mittal for the same reasons discussed *supra* with respect to representative claim 28.

Dependent claim 22

We consider next the Examiner's rejection of claim 22 as being anticipated by Mittal.

Appellant argues that Mittal does not teach a switching counter configured to determine the transition rate of the at least one node but instead discloses an up/down counter that indicates the current utilization of a monitored functional unit (col. 6, ll. 13-16) (Br. 11).

When we look to Appellant's Specification for *context*, we find only a single mention of the claimed "switching counter" described as an *incremental counter*:

The output of the aggregator 220 is then read by *a switching counter or an incremental counter 230*. A value of a stored memory of the *incremental counter 230* may then be increased by a function of the output of the aggregator 220. An output of *incremental counter 230* is then utilized by the mode selection circuit 257 as will be explained below. After a predetermined interval, the value of the *incremental counter 230* will then be reset to the value of "zero" by the timing circuit 235 [emphasis added].
(Specification 12, ¶ 0021).

We broadly but reasonably construe the recited "transition rate" as a clock rate or frequency (or as a function of same). Because Mittal discloses an incremental counter (i.e., an up/down counter that in one mode increments its contents by one during each clock cycle, col. 6, ll. 12-25), we agree with the Examiner that the language of the claim reads on the

reference. Therefore, we will sustain the Examiner's rejection of claim 22 as being anticipated by Mittal.

Dependent claims 23 and 30

We consider next the Examiner's rejection of claims 23 and 30 as being anticipated by Mittal.

Appellant argues that Mittal does not disclose where altering the power characteristic is performed by an action selected from the claimed group (*see* claims 22 and 30). Instead, Appellant asserts that Mittal merely teaches switching functional units between high-performance and low performance states (*see* Mittal, col. 5, ll. 25-30) (Br. 12).

We disagree. We find Mittal expressly discloses removing power to at least a portion of the reconfigurable circuit, as claimed (*see* Mittal, col. 5, ll. 1-3, i.e., "reducing overall power consumption by reducing voltage and/or clock rate"). Therefore, we will sustain the Examiner's rejection of claims 23 and 30 as being anticipated by Mittal.

Dependent claim 24

We consider next the Examiner's rejection of claim 24 as being anticipated by Mittal.

Appellant acknowledges that Mittal discloses incrementing and decrementing a counter at each clock cycle based on the activity of a functional unit (*see* Mittal, col. 6, ll. 13-19). However, Appellant argues that Mittal does not disclose an edge detection circuit (Br. 12-13).

The Examiner disagrees. The Examiner argues that in order to detect a voltage level change, some sort of edge detection circuitry *must be used* to

detect voltage level changes in the signals associated with Mittal's functional unit [emphasis added]. Thus, the Examiner finds Mittal [inherently] discloses at least one edge detection circuit configured to determine a voltage change in the at least one node and also that the transition rate is based on the voltage change (Answer 8, ¶ 1).

We note that “[i]n relying upon the theory of inherency, the Examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic *necessarily* flows from the teachings of the applied prior art.” *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) (emphasis in original). “[A]fter the PTO establishes a prima facie case of anticipation based on inherency, the burden shifts to appellant to ‘prove that the subject matter shown to be in the prior art does not possess the characteristic relied on.’” *In re King*, 801 F.2d 1324, 1327, 231 USPQ 136, 138 (Fed. Cir. 1986) (quoting *In re Swinehart*, 439 F.2d 210, 212-13, 169 USPQ 226, 229 (CCPA 1971)). *See also* MPEP §§ 2112 (IV.), (V.).

This reasoning is applicable here. We find the Examiner has provided a rationale in the Answer that reasonably supports the finding of inherent anticipation. We see no response in the Reply Brief that specifically addresses the Examiner's finding that some sort of edge detection circuitry *must be used* to detect voltage level changes in the signals associated with Mittal's functional unit (*see* Answer 8, ¶ 1). Therefore, we find Appellant has not met the burden of *proving* that the subject matter shown to be in the prior art does not possess the characteristic relied on by the Examiner.

Accordingly, we will sustain the Examiner's rejection of claim 24 as being anticipated by Mittal for the reasons set forth in the Answer.

Dependent claim 25

We consider next the Examiner's rejection of claim 25 as being anticipated by Mittal.

Appellant argues that Mittal does not teach a timing counter configured to track a period of operation of a reconfigurable circuit and a switching counter configured to employ the period of operation to determine a transition rate (Br. 13).

The Examiner disagrees. The Examiner argues that Mittal discloses a switching counter (i.e., an up/down counter) configured to determine a transition rate. The Examiner further argues that a "timing counter *must be used* to keep track of the period of time." (Answer 8, last paragraph).

We find Mittal discloses an up/down counter that, in one embodiment, increments its contents by one during each clock cycle (i.e., switching cycle), as discussed *supra* (see also Mittal, col. 6, ll. 12-19). With respect to the recited timing counter, we again find the Examiner has provided a rationale in the Answer that reasonably supports the finding of inherent anticipation. We find nothing in the Reply Brief that specifically addresses the Examiner's finding that a timing counter *must be used* to keep track of the period of time." (See Answer 8, emphasis added). Therefore, we again find Appellant has not met the burden of *proving* that the subject matter shown to be in the prior art does not possess the characteristic relied on by the Examiner. Accordingly, we will sustain the Examiner's rejection of

claim 25 as being anticipated by Mittal for the same reasons set forth in the Answer.

Dependent claim 29

We consider next the Examiner's rejection of claim 29 as being anticipated by Mittal.

Appellant notes that claim 29 additionally requires the determining step of claim 28 (from which claim 29 depends) to include aggregating a number of switching transitions associated with the node. Appellant argues that it cannot be found where Mittal determines a number of switching transitions associated with a node (Br. 14).

In response, we note again that the frequency of switching transitions in clock-driven digital circuits (e.g., a microprocessor) is determined by the clock frequency (or a function of the clock frequency). Mittal explicitly discloses dividing a system clock by two to implement a reduced-power mode (col. 8, ll. 29-32, Fig. 2). Therefore, we find Mittal discloses the argued feature of determining a number of switching transitions associated with a node (i.e., by altering the clock frequency).

We further find the argued feature of determining a number of switching transitions associated with a node is met by Mittal's up/down counter that, in one embodiment, increments its contents by one during each clock cycle (i.e., switching cycle or switching transition) that the functional unit (i.e., node) is active, as discussed *supra* (see also Mittal, col. 6, ll. 12-19). Thus, we agree that Mittal's counter determines the number of switching transitions by counting. We find the counter value represents the aggregate number of switching transitions. Therefore, we agree with the

Examiner that Mittal discloses the recited limitation of “aggregating a number of switching transitions associated with said node.” (Claim 29). Accordingly, we will sustain the Examiner’s rejection of claim 29 as being anticipated by Mittal for essentially the same reasons argued by the Examiner in the Answer.

Dependent claim 31

We consider next the Examiner’s rejection of claim 31 as being anticipated by Mittal.

Appellant notes that Claim 31 additionally requires that the step of “determining a transition rate” (as recited in claim 28) is based on a number of voltage changes in the at least one node. Appellant argues that Mittal does not disclose determining the transition rate based on a number of voltage changes in the at least one node because Appellant does not see where Mittal discloses determining a transition rate of a least one node (Br. 14).

We disagree. We note that we have found *supra* that Mittal discloses determining a transition rate of a least one node (*see* discussion of claims 21 and 28 *supra*). Specifically, we have found that the recited step of “determining a transition rate ...” broadly but reasonably reads on altering a clock rate to save power, as disclosed by Mittal (col. 5, ll. 1-3; col. 8, ll. 29-32, Fig. 2). Because a digital clock signal *transitions* or switches from a low or zero voltage potential to a higher voltage potential at a *rate* that corresponds to the determined clock frequency, we find Mittal discloses all that is claimed. Accordingly, we will sustain the Examiner’s rejection of

claim 31 as being anticipated by Mittal for essentially the same reasons argued by the Examiner in the Answer.

Dependent claim 32

We consider next the Examiner's rejection of claim 32 as being anticipated by Mittal.

Appellant argues that claim 32 additionally requires tracking a period of operation of the reconfigurable circuit and employing the period of operation when determining the transition rate. Appellant again contends that because Mittal does not teach determining the transition rate of at least one node that it follows that Mittal does not teach tracking a period of operation of the reconfigurable circuit and employing the period of operation when determining the transition rate (Br. 15).

We disagree. We have found *supra* that Mittal discloses determining the transition rate of at least one node (*see* discussion of claim 31). Furthermore, we find Mittal discloses tracking a period of operation of the reconfigurable circuit (i.e., functional circuit) and employing the period of operation when determining the transition rate (*see* Mittal's up/down counter and associated activity-level functions, where, in one embodiment, the activity monitor enforces a maximum sustainable duty cycle of fifty percent, col. 6, ll. 30-32, and associated discussion col. 6, ll. 13-49). Therefore, we find the weight of the evidence supports the Examiner's position. Accordingly, we will sustain the Examiner's rejection of claim 32 as being anticipated by Mittal.

Independent claim 34

We consider next the Examiner's rejection of independent claim 34 as being unpatentable over Mittal.

Appellant asserts that Mittal does not teach reconfiguring a reconfigurable circuit by altering a power characteristic applied to at least a portion thereof based on a comparison between a transition rate and a predetermined operating range. More specifically, Appellant argues that Mittal does not teach reconfiguring a reconfigurable circuit since Mittal teaches reducing power consumption of a circuit by throttling the performance of the circuit. (*See* Mittal, col. 4, lines 19-28). Thus, Appellant concludes that Mittal provides no motivation to one skilled in the art to dynamically control the power utilization of a circuit by reconfiguring the circuit (Br. 15-16).

The Examiner disagrees. The Examiner essentially restates the arguments previously made with respect to independent claims 21 and 28 (Answer 11).

We note that the initial burden of establishing unpatentability, on any ground, rests with the Examiner. *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). "If that burden is met, the burden of coming forward with evidence or argument shifts to the applicant. After evidence or argument is submitted by applicant in response, patentability is determined on the totality of the record by preponderance of evidence with due consideration to persuasiveness of argument." *Id.* at 1445, 24 USPQ2d at 1444.

We have found *supra* that Mittal discloses reconfiguring a reconfigurable circuit (*see* discussion of claims 21 and 28). We further find that Mittal discloses dynamically controlling the power utilization of a circuit by reconfiguring the circuit since Mittal explicitly discloses dividing a system clock by two to implement a reduced-power mode (col. 8, ll. 29-32, Fig. 2). Thus, we find Mittal teaches altering a power characteristic based on a comparison between a transition rate (i.e., clock rate or frequency) and a predetermined operating range (e.g., a 1x clock frequency vs. a divide-by-two clock frequency).

With respect to the issue of motivation, the Examiner has acknowledged that Mittal does not disclose the reconfigurable circuit comprises a monitored circuit with a *delay element* and a *multiplier* (*see* Answer 5-6). The Examiner asserts in the Answer that it would have been obvious to an artisan to combine such well known elements (i.e., a delay element and a multiplier) with the teachings of Mittal (*id.*).

After carefully reviewing the evidence before us, we find Appellant has failed to traverse the Examiner's conclusion that a person of ordinary skill in the art would have been motivated to combine a *delay element* and a *multiplier* with the teachings of Mittal (*id.*). Thus, we find Appellant has not met the burden of coming forward with evidence or argument to rebut the Examiner's legal conclusion of obviousness. Because we find the Examiner has met the burden of presenting a *prima facie* case of obviousness, we will sustain the Examiner's rejection of independent claim 34 as being unpatentable over Mittal.

Dependent claims 37 and 38

We will sustain the Examiner's rejection of claim 37 as being unpatentable over Mittal for the same reasons discussed *supra* with respect to claim 23. Likewise, we will sustain the Examiner's rejection of claim 38 as being unpatentable over Mittal for the same reasons discussed *supra* with respect to claim 24.

Dependent claims 26, 27, 35, 36, 39, and 40

Lastly, we consider the Examiner's rejection of claims 26, 27, 35, 36, 39, and 40 as being unpatentable over Mittal.

We have considered each of dependent claims 26, 27, 35, 36, 39, and 40, as separately argued by Appellant. With respect to each of claims 26, 27, 35, 36, 39, and 40, we find Appellant has: (1) recited the language of the claim, (2) asserted that the limitations are not taught or suggested by Mittal, and, then, (3) failed to respond to the specifics of the Examiner's rejection (i.e., we find Appellant has failed to traverse the Examiner's finding that combining certain well known elements with Mittal would have been obvious).

For example, with respect to dependent claims 26 and 39, Appellant states that both these claims require that the mode selection circuit include a sample and hold circuit coupled to two voltage comparators. Appellant then merely asserts that Mittal does not teach or suggest these limitations (*See Br 16*). We note that the Examiner does not rely on Mittal for the teaching of a sample and hold circuit coupled to two voltage comparators (*See Answer 11, ¶ 3*). Instead, the Examiner, as finder of fact, has determined that sample

and hold circuits and voltage comparators are such well known elements that it would have been obvious to an artisan to combine such well known elements with the teachings of Mittal as a way of implementing Mittal's mode selection circuitry. Thus, we find Appellant has failed to traverse the Examiner's rejection (i.e., the Examiner's legal conclusion of obviousness) by explaining why the Examiner erred.

Because Appellant repeats this same pattern of argument for each of dependent claims 26, 27, 35, 36, 39, and 40, we find in each case the Examiner's argument directed to obviousness has not been challenged by Appellant. Thus, we find Appellant has not met the burden of coming forward with evidence or argument to rebut the Examiner's legal conclusion of obviousness. We note that arguments which Appellant could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii)(2004). *See also In re Watts*, 354 F.3d 1362, 1368, 69 USPQ2d 1453, 1458 (Fed. Cir. 2004).

We further find Appellant has failed to comply with the requirements of 37 C.F.R. § 1.111(b) by merely reciting the language of the claim and asserting that such language is not taught by the reference. We note that a statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim. *See* 37 C.F.R. § 41.37(c)(1)(vii)(2004). Therefore, after carefully considering the totality of the record by preponderance of evidence with due consideration to persuasiveness of argument, we find Appellant has not shown error in the Examiner's prima facie case of obviousness. Accordingly, we will sustain

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the Examiner's rejection of claims 26, 27, 35, 36, 39, and 40 as being unpatentable over Mittal.

DECISION

We have sustained the Examiner's rejection of all claims on appeal. Therefore, the decision of the Examiner rejecting claims 21-40 is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

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HITT GAINES, PC
LSI Corporation
PO BOX 832570
RICHARDSON TX 75083